Azure SQL Database

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Introduction

Azure SQL Database Deployment Types

Single Database
Own set of resources

Elastic Pool
Collection of databases
sharing resources

Managed Instance
Dedicated engine
instance running
collection of databases

Introduction

Microsoft SQL Server

SQL Server on Azure VMs
SQL Server inside a
fully-managed VM in Azure

- Why SQL Server in Virtual Machine
- Demo – Provision Database in Virtual machine

Introduction

- What is Single Database deployment option?
  - Demo – Provision Single Database
- Purchasing models
  - vCore vs DTU
  - Service tiers
- Azure Database vs Azure Data Warehouse

Introduction

Elastic pool

- What is Elastic pool deployment option?
- Demo – Provision multiple database in to Elastic pool

Introduction

- What is Managed instance deployment option
- Migration options
- Service Tiers
- On-premises vs MI
- Management options – Create/update/delete
- Demo – Provision MI Database

Introduction

- Azure Database Security
- 4 layers of defense
  - Network security,
  - Access Management
  - Threat protection
  - Information Protection
- Advance security option for Managed Instance

Why SQL Server in Azure?

Fully Managed

Predictable performance and pricing

Elastic pool for unpredictable workloads

99.99% availability built-in

Geo-replication and restore services

Supports existing SQL Server tools, libraries, and APIs

Scalability with no downtime

Secure and compliant for your sensitive data

Azure IaaS vs PaaS Database offerings?

SQL Server on Azure VMs
SQL Server inside a
fully-managed VM in Azure

Azure SQL Database
Database-as-a-service (DBaaS)
hosted in Azure

Responsibility comparison

SQL Server on Azure VMs

SQL Server inside a
fully-managed VM in Azure

Azure SQL Database

Database-as-a-service (DBaaS)
hosted in Azure

Benefits comparison

SQL Server on Azure VMs

SQL Server inside a
fully-managed VM in Azure

Azure SQL Database

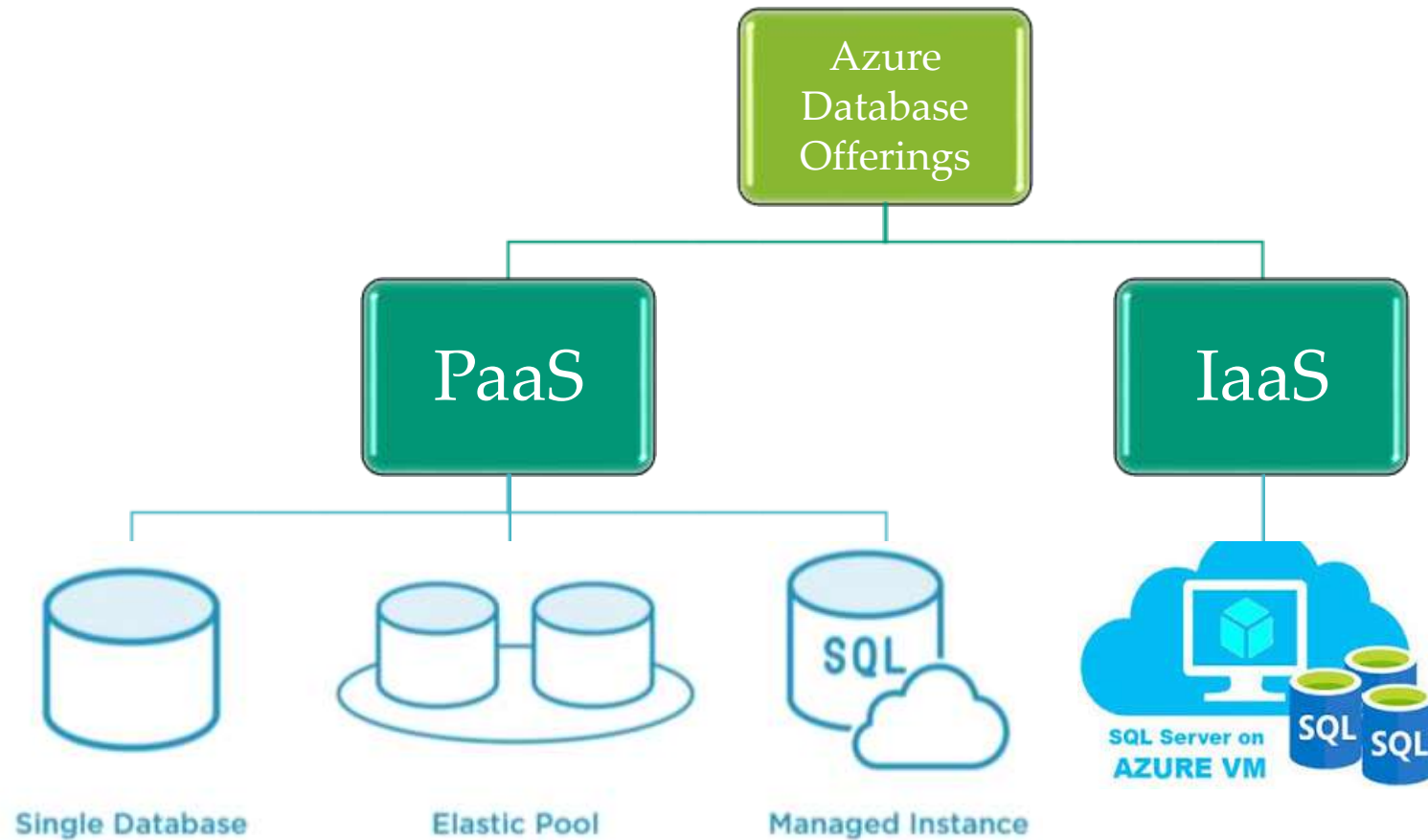Database-as-a-service (DBaaS)
hosted in Azure

Limitations comparison

SQL Server on Azure VMs
SQL Server inside a
fully-managed VM in Azure

Azure SQL Database
Database-as-a-service (DBaaS)
hosted in Azure

Azure Database Deployment options

SQL Server(PaaS) Deployment Options

Single Database
Each DB with its own guaranteed compute, memory, and storage

Elastic pool
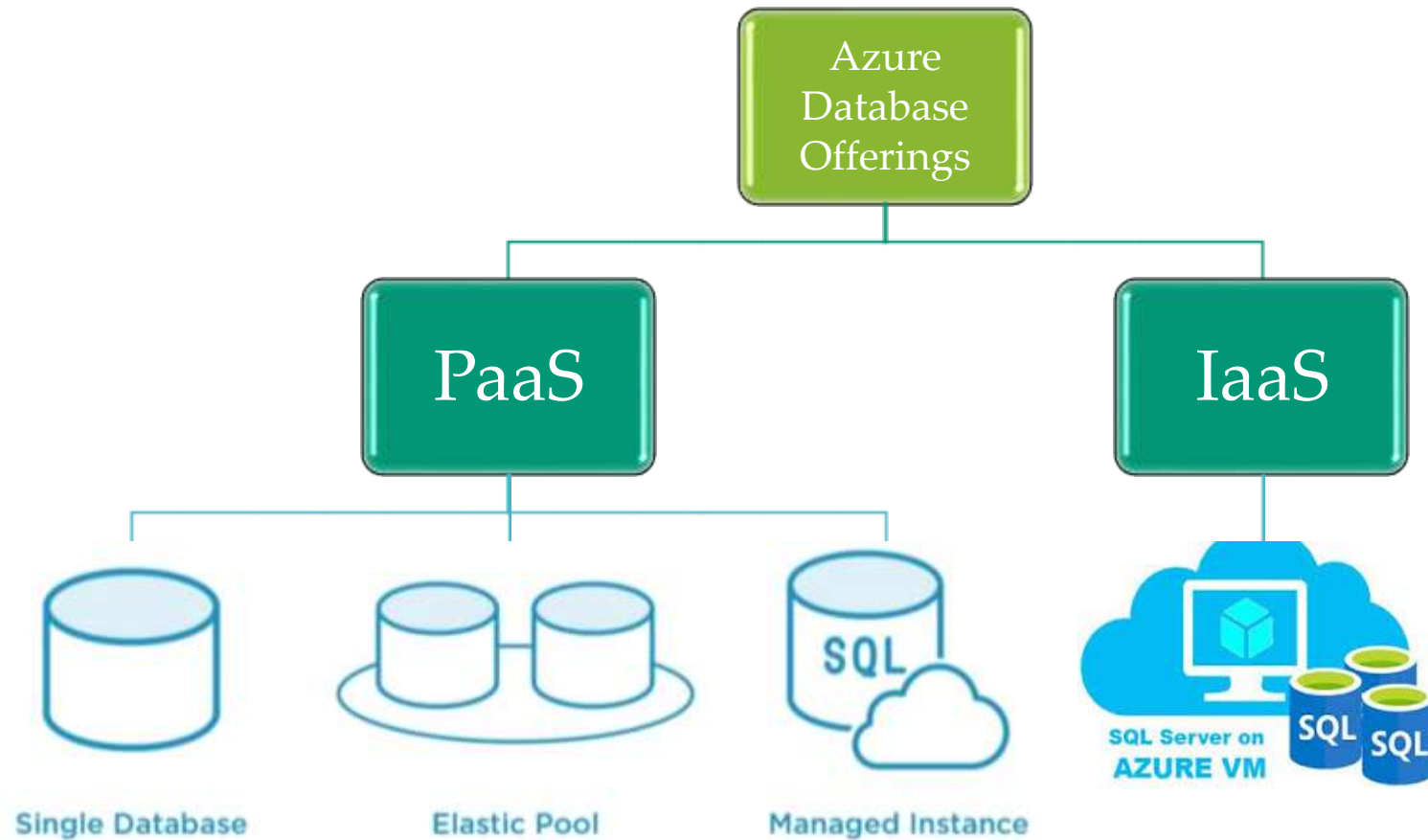Fixed resources will be shared by all databases in the pool

Managed instance
Each managed instance has its guaranteed resources

Azure Database Deployment options

Azure Database Offerings

PaaS — IaaS

Single Database   Elastic Pool   Managed Instance   SQL Server on AZURE VM

SQL Server on Virtual machine

Full Version of SQL Server in Cloud

Geographic regions

Variety of Configuration to Choose

SQL Server on Virtual machine

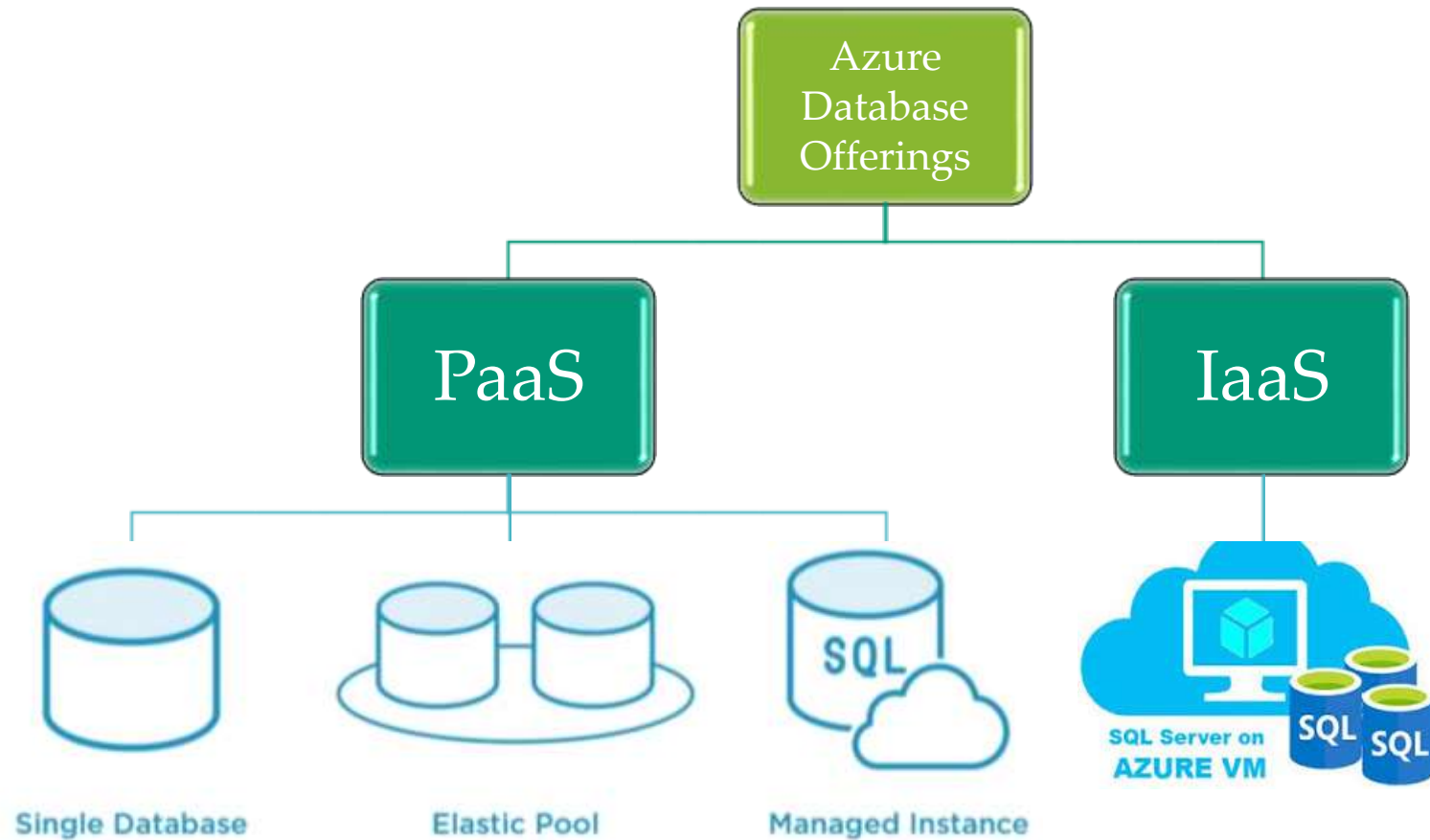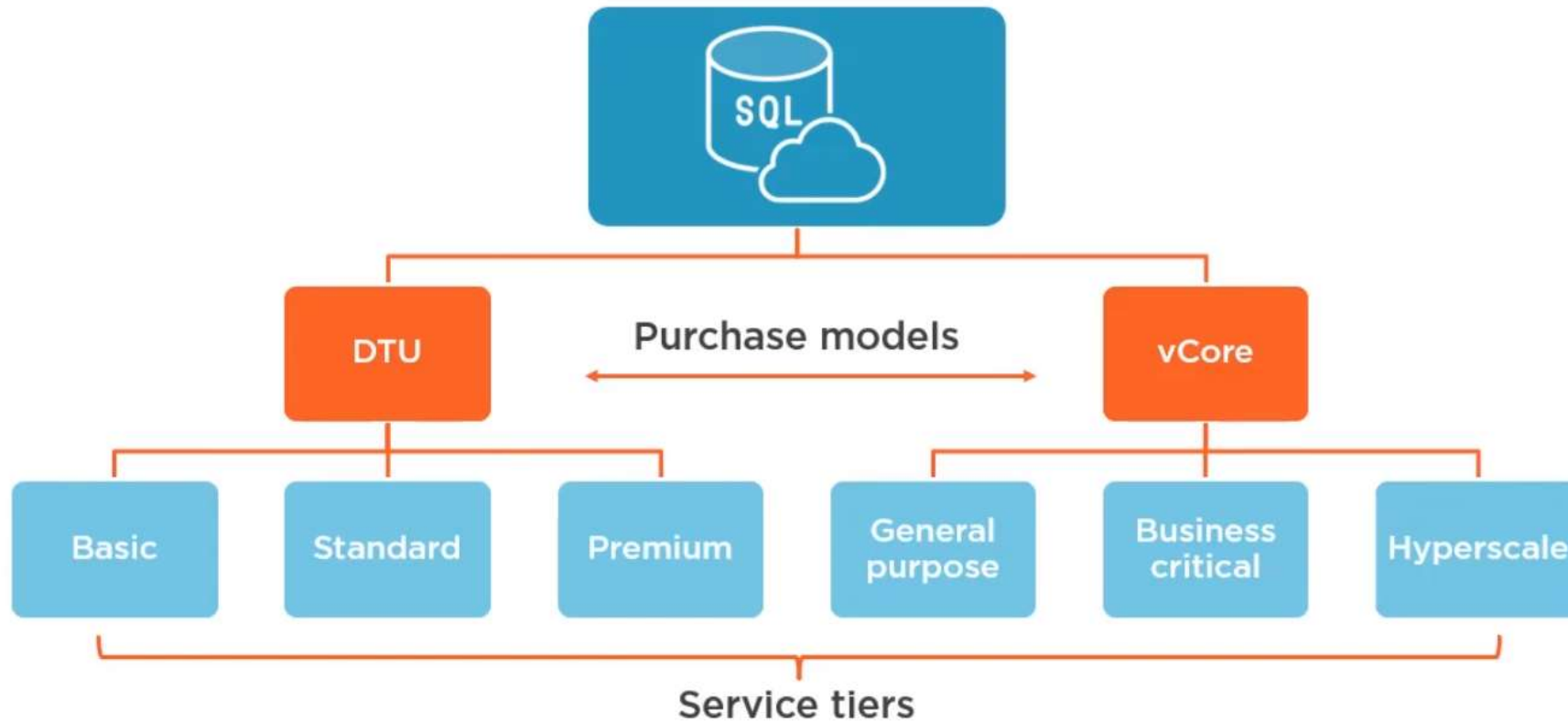Automatic Updates

Automatic Updates

High Availability

Automatic Updates

Azure Database Deployment options

Azure SQL Database Service Tiers

vCore-based vs DTU-based Model

vCore-based

- For Single database, elastic pool and managed instance
- Best for customers who need flexibility, control, and transparency
- Straightforward way to translate on-premises workload to the cloud
- Microsoft recommends vCore-based model

DTU-based

- Only for single database and elastic pool
- Best for customers who want single, preconfigured resource options
- Might need to calculate the needed DTUs before migration
- If the DTU-based purchasing model needs your performance and business requirements, you should continue using it.

Converting DTU-based Model to vCore-based

- If you single database or elastic pool consumes more than 300 DTUs, converting to the vCore-based model might reduce your costs

- You can use API of your choice or Azure Portal to convert to vCore based model with 'no downtime'.

- Azure SQL Database managed instance only supports vCore-based purchasing model.

Azure SQL Database Service Tiers
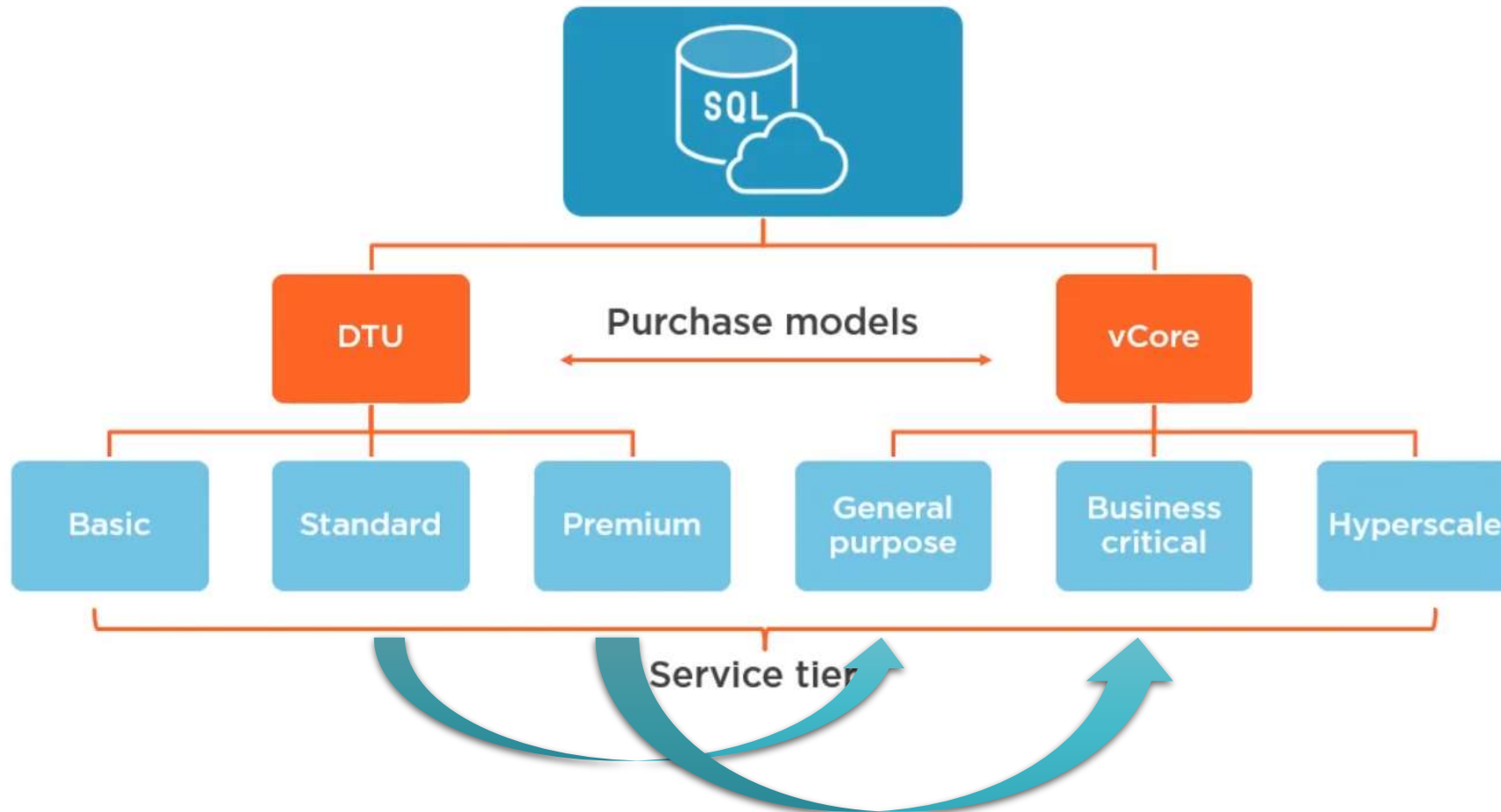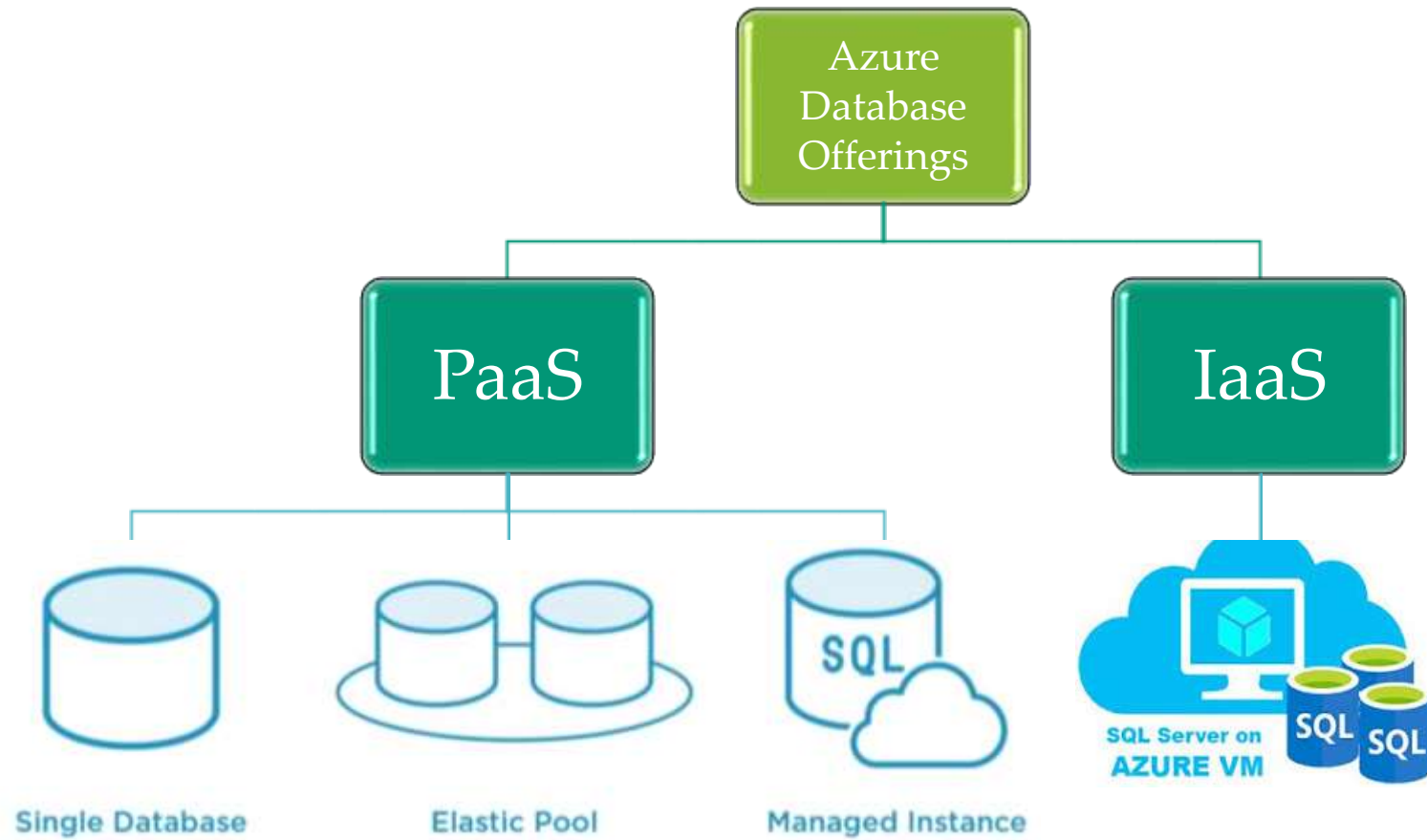
Azure SQL Database Options

Azure SQL DB vs. Azure SQL DW

Azure
SQL Database

Azure
SQL Data Warehouse

Azure Database Elastic Pool

Azure Database Offerings

PaaS

IaaS

Single Database

Elastic Pool

SQL

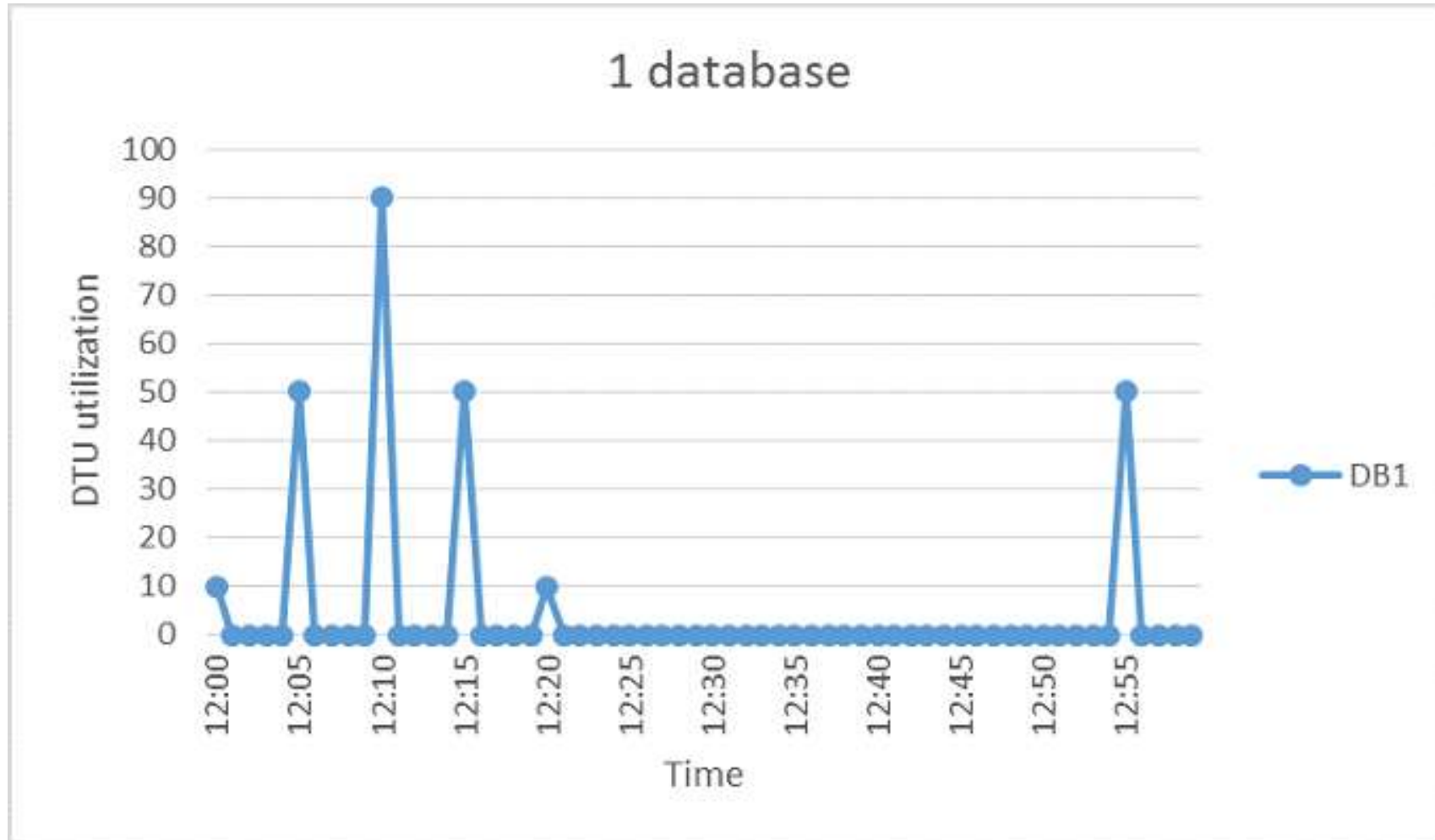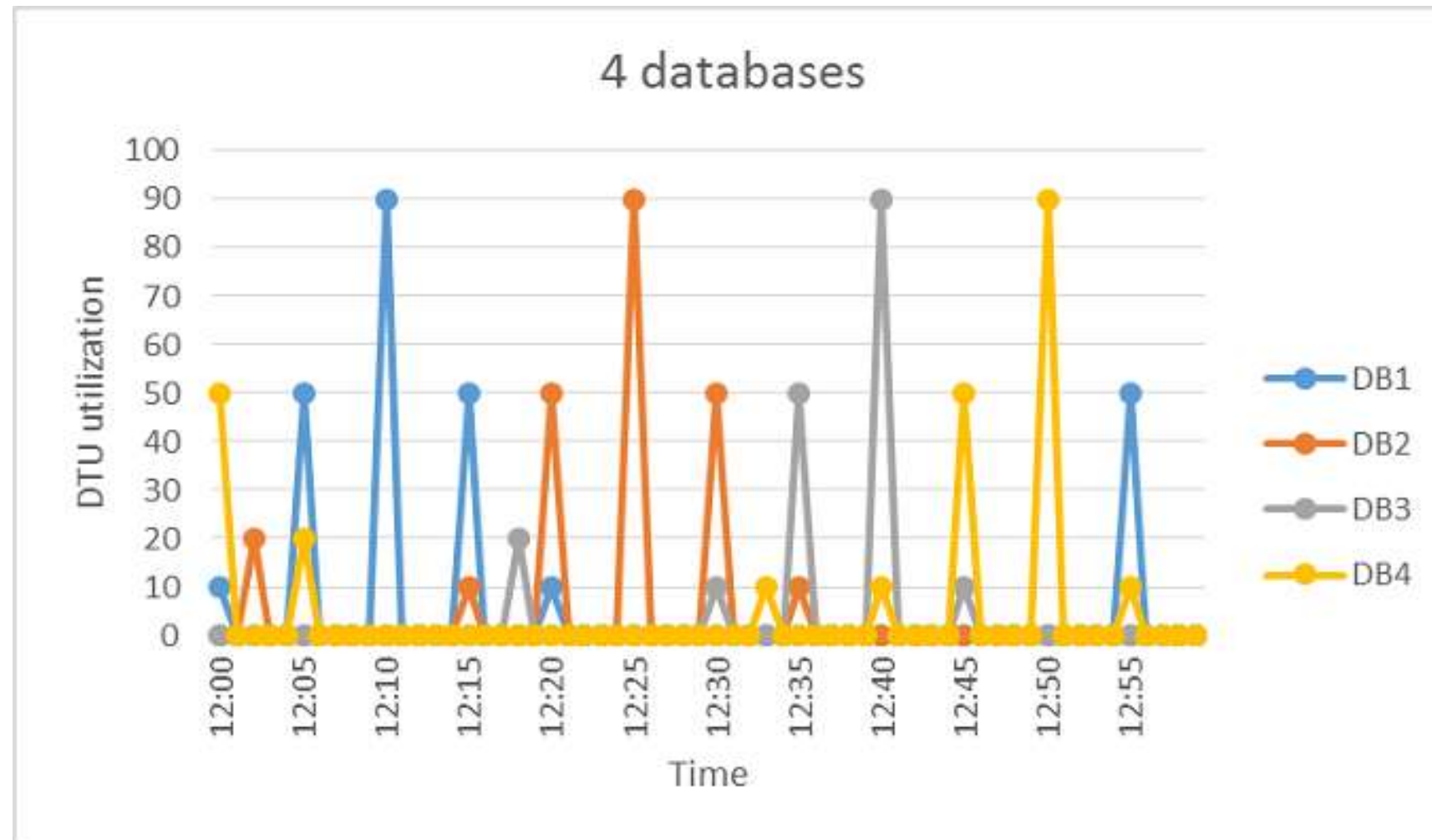Managed Instance

SQL Server on AZURE VM

SQL SQL
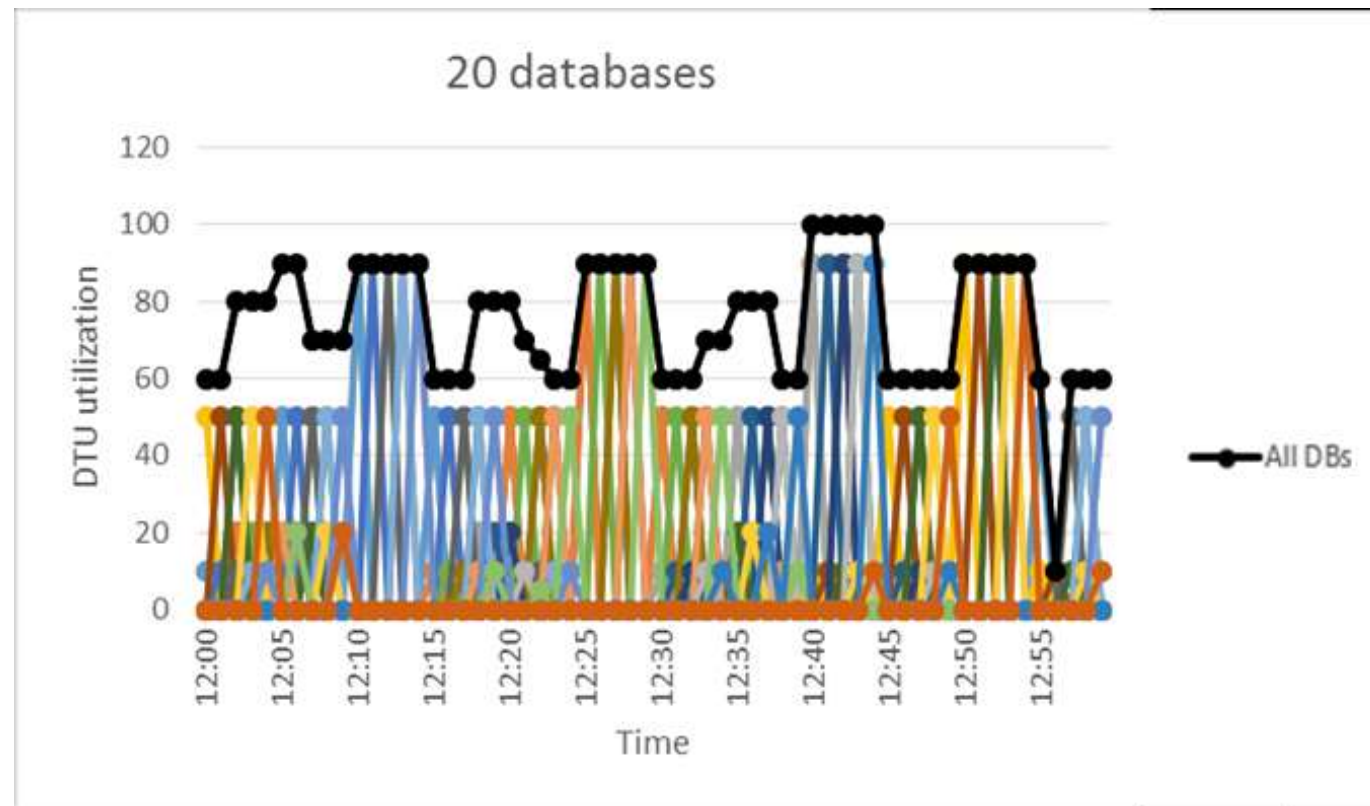
SQL Database Elastic Pools

An Azure SQL Elastic Pool allows you to allocate a shared set of compute resources to a collection of Azure SQL databases,

Database Challenges

Azure SQL Database Elastic Pool

So Azure SQL elastic pool is a cost- effective solution for managing and scaling multiple databases that have varying and unpredictable usage demands.

The databases in an elastic pool are on a single Azure SQL Database server and share a set number of resources at a set price.

Elastic pool enables developers to optimize the price performance for a group of databases within a prescribed budget.

Elastic pools prevent over-provisioning or under-provisioning of resources.

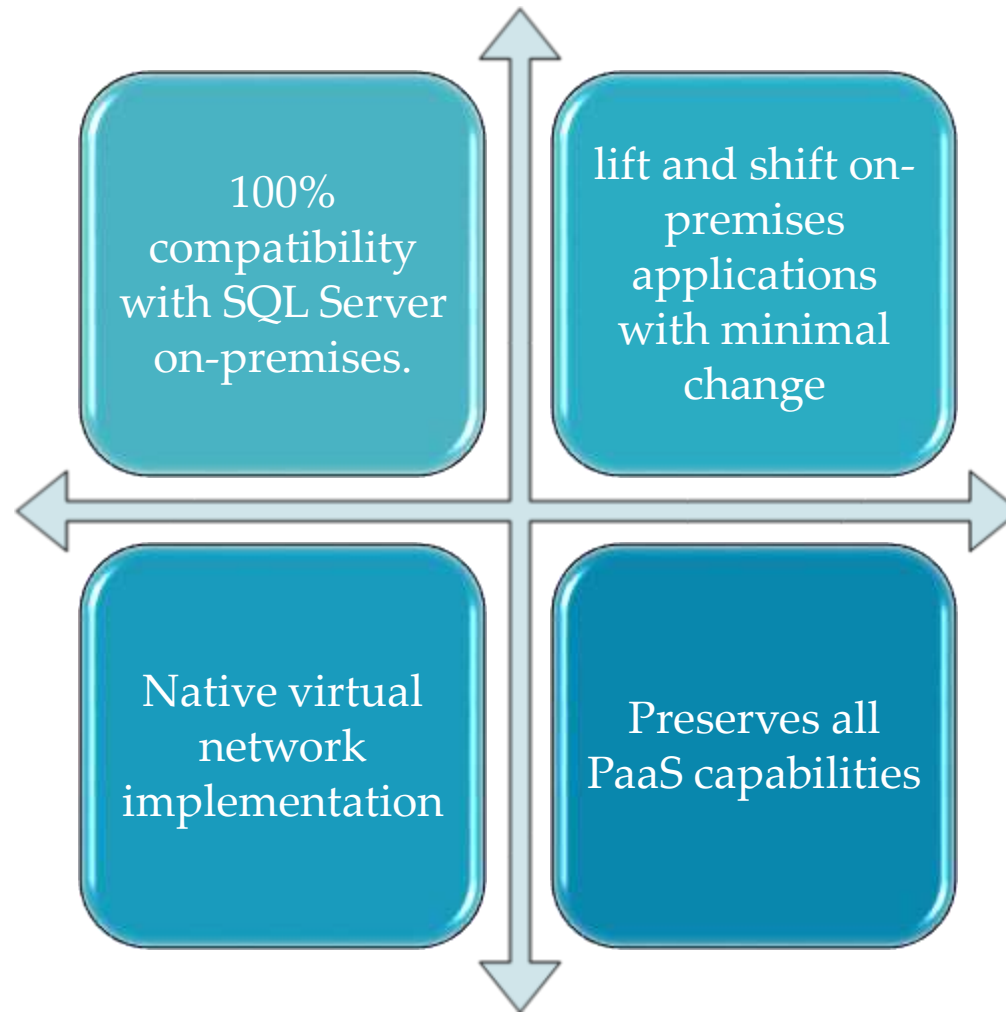# Azure Database Managed Instance
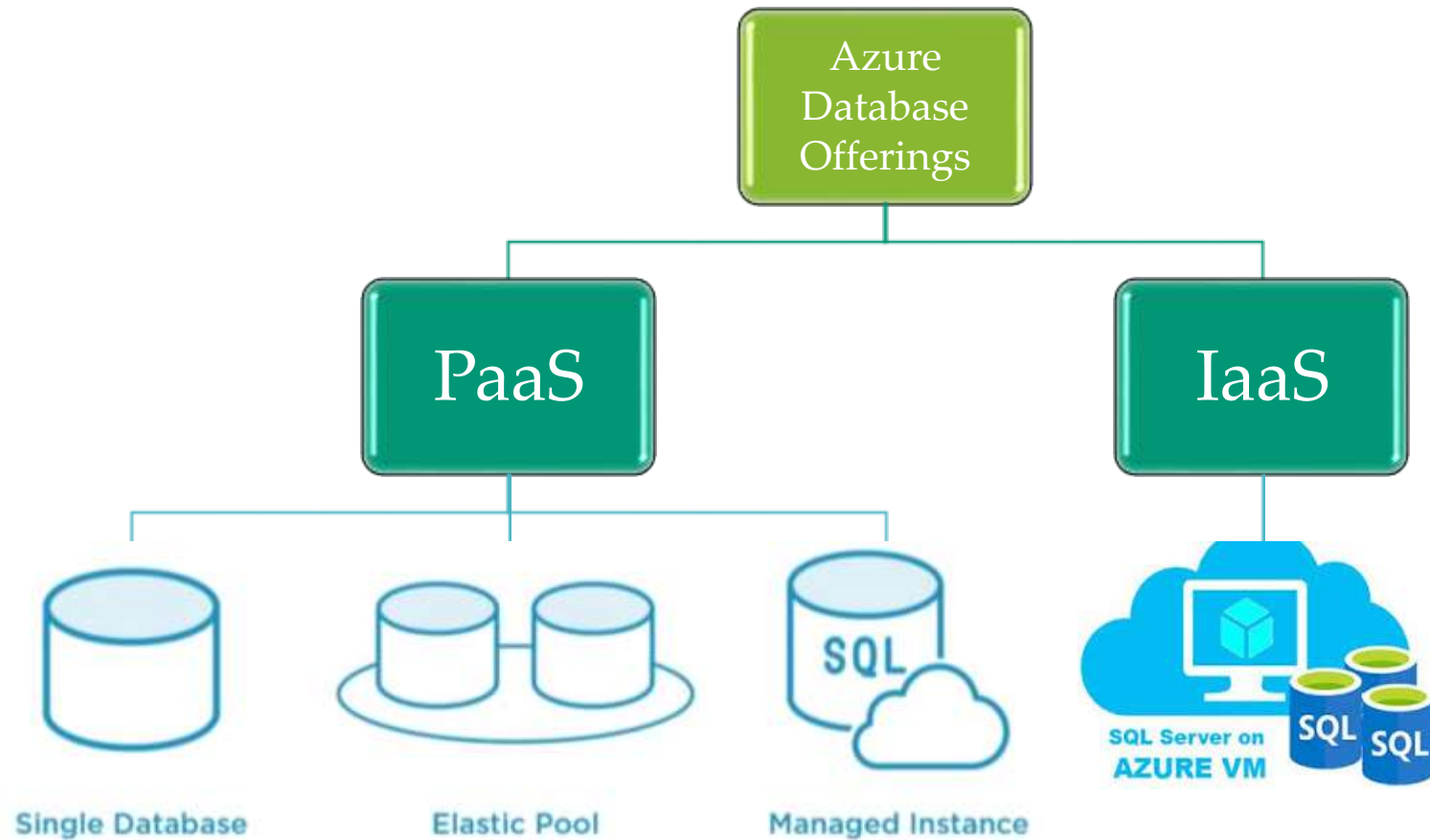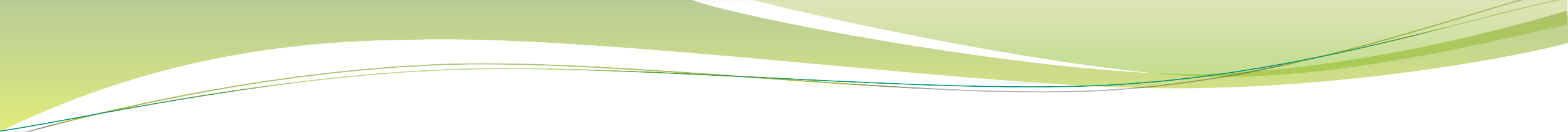
Azure Database Managed Instance

So the managed instance is a deployment option of Azure SQL Database providing near 100% compatibility with the latest SQL Server on-premises.
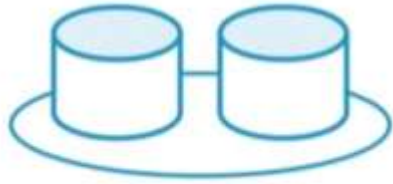
Azure Database Managed Instance

The managed instance deployment option targets user scenarios with mass database migrations from on-premises or IaaS databases.

Single Database

Elastic Pool

Managed Instance

Difference between SQL Server On-premises and Managed Instance

High Availability built in and pre-configured
Specifying full physical paths is not supported
AAD authentication is used instead of Windows authentication
Automatically manages XTP file group and in-memory OLTP objects
SSIS is supported via Azure Data Factory (ADF)

Migration Options

Data Migration Service

Backup and Restore

Microsoft SQL Server → ① BACKUP / Upload to URL → Azure Storage → ② RESTORE from URL → SQL Managed Instance

Service Tiers for Managed Instance

General Purpose

Business Critical

Standard Edition

Enterprise Edition
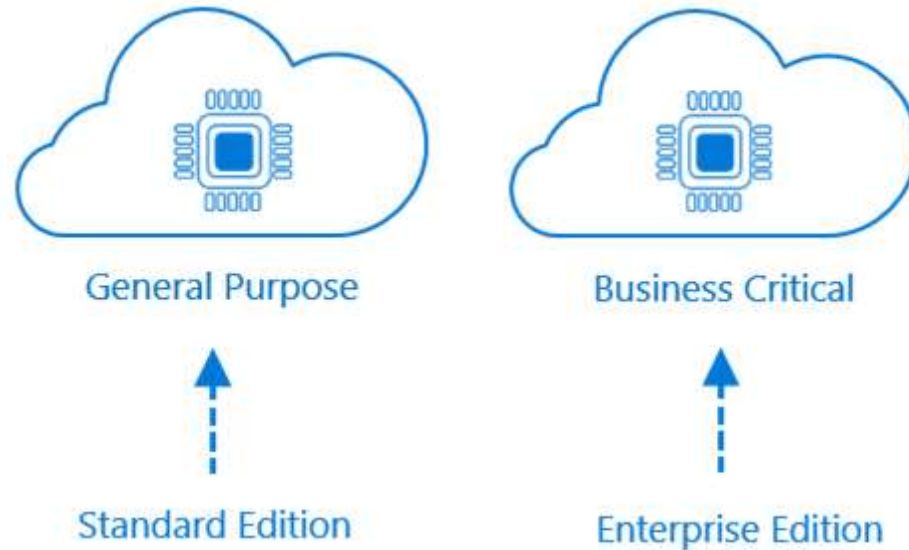
Management Options

Instance deployment
- New instance creation
- 90% of operation finish in 4 hours

Instance Update
- Changing instance properties like vCores or storage
- 90% of cluster expansions finish in less than 2.5 hours

Instance Deletion
- 90% of virtual cluster deletions finish in 1.5 hours

Security
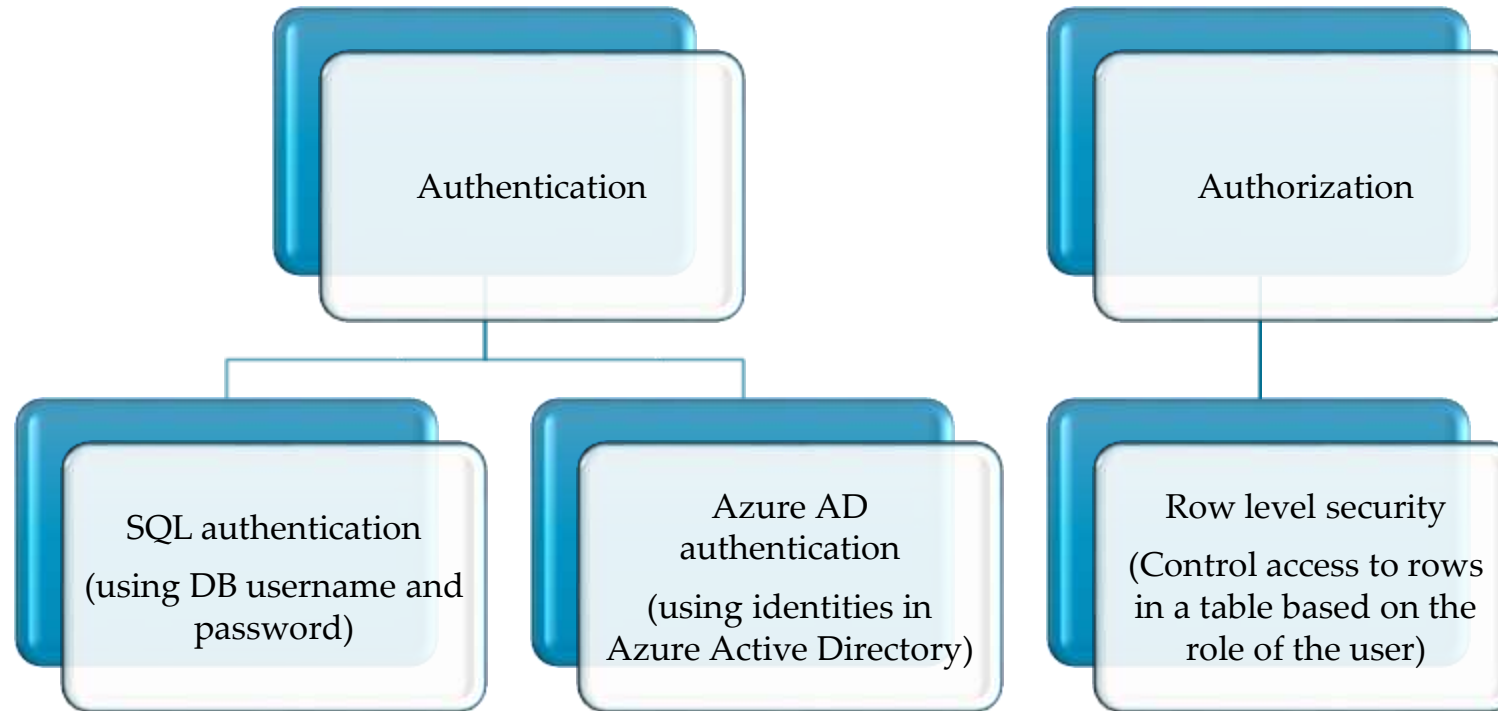
Network security

IP firewall rules	• Grant access to databases based on the originating IP address of each request.
Virtual network firewall rules	• Enable Azure SQL Database to only accept requests originating from subnets inside a virtual network.

Access Management

Threat Protection

SQL auditing in Azure Monitor logs and Event Hubs

- Tracks database activities and helps maintaining compliance with security standards

Advanced Threat Protection

- Analyzes your SQL Server logs to detect unusual behavior and potentially harmful attempts

Information Protection

Transport Layer Security TLS
- Always enforces encryption for all connections

Transparent Data Encryption
- (Protects data at rest from offline access to raw files or backups)

Dynamic Data masking
- (Protects sensitive data by masking it for non-privileged users)

Information Protection

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Security Management

Vulnerability assessment
- Discover track and remediate potential database vulnerabilities.

Data discovery & Classification
- Identify and label sensitive data for monitoring and alerting

Managed Instance Advance Security

Native virtual network implementation and connectivity to your on-premises environment using Azure Express Route or VPN Gateway.

In a default deployment, SQL endpoint is exposed only through a private IP address, allowing safe connectivity from private Azure or hybrid networks.

Single-tenant with dedicated underlying infrastructure (compute, storage).